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Atty. Docket No. 2001-1112  
PATENTS  
Same

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Arie Cornelis BESEMER et al. Confirmation No. 5309

Serial No. 09/830,871 GROUP 1623

Filed August 3, 2001 Examiner L. Maier

CARBOHYDRATE OXIDATION  
PRODUCTS AND DERIVATIVES

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TECH CENTER 1600/2900

Commissioner for Patents

Washington, D.C. 20231

Sir:

Responsive to the determination of lack of unity set forth in the Official Action of November 5, 2002, applicants hereby provisionally elect Group I, claims 15-21, drawn to an oxidized carbohydrate, with traverse.

The grounds for traverse are as follows: The claimed invention of the present national stage application was subject to examination during the international phase of the PCT application. The international Examiner found no lack of unity, applying the same legal standard to the identical facts. Thus, it is believed that the U.S. Patent Office cannot now contend the examination of the pending claims in the present application would present an undue searching burden. Indeed, the U.S. Examiner has the considerable benefit of the search results generated by the international Examiner, on the basis of all of the pending claims in the present application.

Furthermore, the Official Action does not explain why, applying the identical legal standard to the identical claims, the opposite result is now being reached in the present U.S. national phase application, relative to the international application.

The outstanding Official Action contends that the inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because they lack a corresponding special technical feature. The outstanding Official Action contends that JEANES et al. and LEROY et al. disclose a special technical feature. However, applicants respectfully traverse this contention.

Applicants respectfully submit that neither JEANES et al. nor LEROY et al. disclose or suggest carbohydrate derivatives having both aldehyde groups and carboxyl groups derived from oxidation of the 1,2-dihydroxy ethylene groups of the carbohydrate.

The Examiner's attention is respectfully directed to the attached **Formula Sheet**. Formula I thereof represents a carbohydrate like starch or cellulose. Reference is further made to starch as an example, but the same applies to other polysaccharides. The 1,2-dihydroxy ethylene group has the position 2 and 3 in Formula 1.

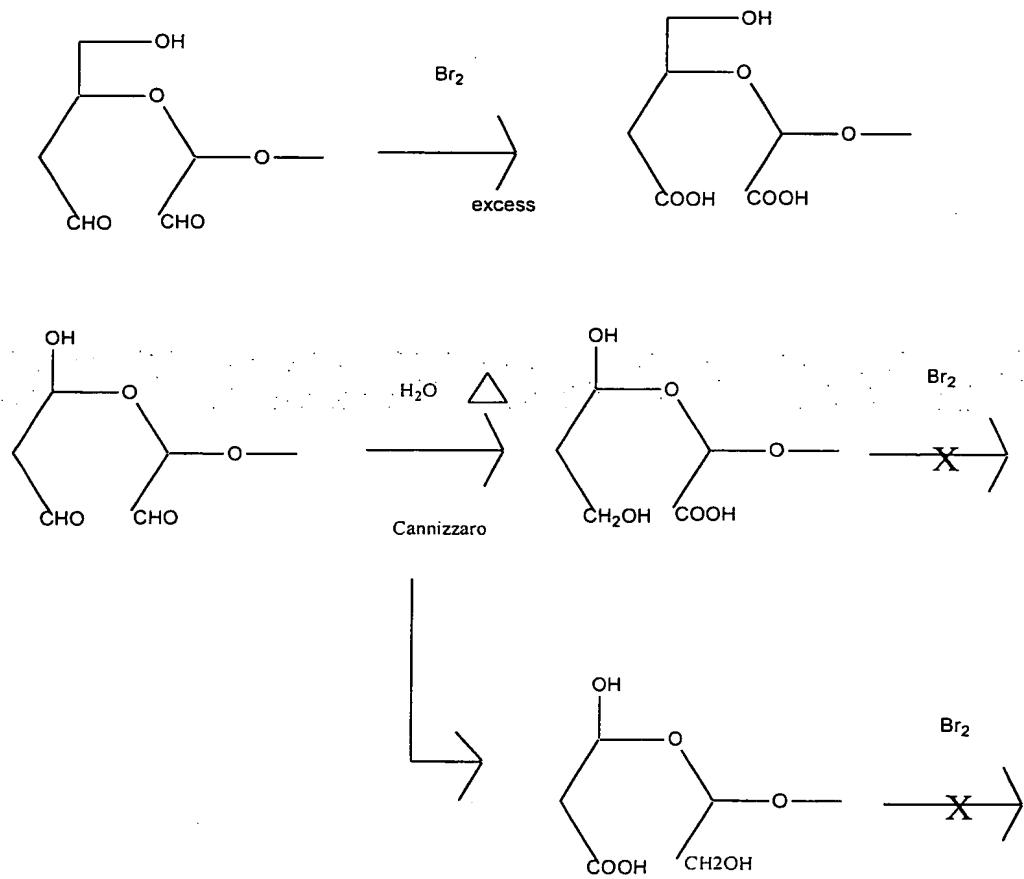
The compounds of the invention are those like Va and Vb wherein the C2-C3 bond has been broken and eventually result in

the presence of aldehyde groups and carboxyl groups. These compounds are obtained from a dialdehyde derivative of Formula II.

The products of JEANES et al. are, primarily, those with Formula II and secondarily those with Formula III, perhaps with those of Formula IV as side products. Applicants note that none of these products have both aldehyde groups and carboxyl groups. In fact, the product P\*, prepared according to JEANES et al. (p. 1567, lines 5-15), is not stated to contain aldehyde groups. It has a barium content of 54% of that expected from complete conversion of aldehyde groups to carboxyl. However, it does not state that the remainder of the 54% would in fact be aldehyde groups.

Moreover, it is rather unlikely that any aldehyde groups are present, in view of the preparation procedure: the starting material is dialdehyde starch (0.05 mole), which is treated with a large excess (0.20 mole, twice the calculated amount) of bromine. Under the reaction conditions, the aldehyde groups are converted to carboxyl groups, and no aldehyde groups would be present anymore. The fact that less (54%) than the expected maximum of carboxyl groups is present, must be due to the preceding heat treatment of the dialdehyde starch at 100°C for 45 minutes, which is known to lead to Cannizzaro reactions, i.e. disproportionation of the dialdehyde functions to alcohol plus carboxylic acid functions; the alcohol functions are not

available and hence detract from the possible total of carboxyl groups. In addition these two types of reactions, further side reactions, such as chain degradation, will detract from the desired reaction according to JEANES et al. The desired oxidation reaction of JEANES et al. and the Cannizzaro side reaction are presented below.



Thus, the presence of a product having both aldehyde groups and carboxylic groups is neither stated by JEANES et al., nor likely in view of the teaching of JEANES et al. Thus, a product having

both type of groups is not disclosed by JEANES et al., and even less is a product having the specific aldehyde/carboxyl ratios of the present claim disclosed in JEANES et al., or anywhere else in the cited literature.

As to LEROY et al., the amino substituted products of LEROY et al. are obtained by amino-functionalization of keto groups, and since keto groups in carbohydrates such as starch are only present in cyclic, non-disrupted carbohydrate units, the amino groups are also present in cyclic units. Thus, the presently claimed products are clearly distinguished over the products of LEROY et al.

LEROY et al. refer to starches having both carbonyl groups and carboxyl groups. However, LEROY et al. make it clear that the aldehyde groups only result from starch derivatives, having hydroxyl-containing side-chains. Hydroxyl groups in the starch chain itself are only oxidized to keto groups (see especially column 3, lines 36-40 and further column 4, lines 59-63). Thus, the products of Tables I and II of LEROY et al. must contain keto groups, which is also in accordance with the oxidation types, which only result in dicarboxy starch having Formula III or to keto starch having the Formula VIa and VIb and possibly VII.

In conclusion, neither JEANES et al. nor LEROY et al. explicitly or implicitly disclose or suggest compounds having

both aldehyde and carboxyl functions as in Formula Va, let alone with the required ratio of the current claims.

It would appear that at least Groups I and II, but almost certainly Groups III and IV are linked by the common feature of the structure of the product of Group I, and thus the restriction requirement would be improper.

Thus, it is believed that the Official Action fails to comply with the requirements of PCT Rules 13.1 and 13.2, in seeking to justify the lack of unity determination. Specifically, the definition of "special technical feature" in PCT Rule 13.2 is art-based. Thus, a proper lack of unity determination would require citation of a reference as showing the special technical feature of the present invention. No such proper citation having been made in the outstanding Official Action, the lack of unity determination is improper as a matter of law.

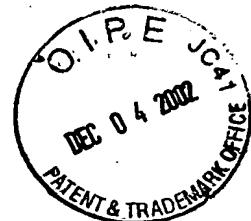
In light of the above discussion, therefore, it is believed that the applicants are entitled to an action on the merits of all pending claims, in their full scope, in the present application. Such action is accordingly respectfully requested.

Respectfully submitted,

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## Formula Sheet

